Imaging imagery

Propositions of the thesis

IMAGING IMAGERY

An investigation of visual cognition using high-resolution fMRI

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1. The fine-grained cortical representations of direction of visual motion and binocular disparity overlap in the human middle temporal area.

2. Motion imagery can lead to specific brain activation patterns in early and mid-level visual areas that allow for a decoding of different imagined visual motion directions.

3. Reconstructed visual fields (by means of reversely mapping brain activity through a perception-trained pRF model) can reveal the content of very controlled visual mental imagery such as letter imagery. This allows for imagery decoding experiments without specific imagery localizers.

4. Ultra-high field fMRI experiments on mental imagery reveal neural correlates of visual imagery that may be used in future BCIs relying on a neuroimaging method more feasible for BCIs than ultra-high field fMRI.

5. In experiments on mental imagery, subject instruction and training is of utmost importance to the quality and uniformity of the results.

6. Our understanding of interindividual differences in neuroimaging studies on mental imagery is still very limited. Future studies need to explain such differences between subjects.

7. The hen-and-egg problem of cueing experimental conditions in mental imagery experiments, that is, whether cues can account for the found brain activation patterns, cannot be solved.

8. Acquiring fMRI data at ultra-high spatial resolution comes at a price besides actual scanning costs: data analysis pipelines have to be adapted to the massive amounts of data. Additionally, observable interindividual differences scale with the spatial resolution of the data.

9. The free sharing of knowledge, data, and source code within and among publicly funded research institutions should not only be encouraged and rewarded at every level, but should be enforced institutionally.